growth, however, as is frequently true in chemical and physical processes, the coefficient falls as the temperature rises above 0° C.

At temperatures above 29° C. the initial rate is not maintained, but fluctuates or falls as time elapses, the well known *time factor* of BLACKMAN. At 30° and 35° C. the initial fall in rate is followed by a rise, which in turn is followed by a continuous fall, while at 40° C. the fall in growth rate is continuous with the elapse of time. This is comparable to the respiratory intensities at higher temperatures as determined by KUIJPER.[22]

The growth minimum for the organ studied is −2° C. and the maximum 44°5 C. In lieu of the errors involved in the old conception of optima, as shown by BLACKMAN and confirmed by many others, LEITCH proposes a new definition for *optimum temperature* in relation to any process in the organism, namely, *the highest temperature at which no time factor enters.* For the organ studied the point is between 28° and 30° C. A fourth cardinal point is defined, namely, *maximum-rate temperature*, as *the temperature at which the process attains its highest intensity*, which is 30°3 C. in this organ.

It is to be regretted that the author did not have an opportunity to examine the excellent work of LEHENBAUER (thesis, Illinois, 1914), who had, in large part, obtained similar results and arrived at similar conclusions.—WM. CROCKER.

Subalpine flora.—In continuing a series of phytogeographical papers, the first of which was recently reviewed in this journal,[23] RYDBERG[24] has discussed the forests and grasslands of the zones immediately below the alpine. He distinguishes two principal areas in the Rockies separated by a break in the range occurring in Wyoming about where the Union Pacific Railroad crosses. This break divides the portion of the region under discussion into the northern and the southern Rockies. The northern Rockies extend from the Yukon southward, and are made to include the Sawtooth Mountains of Idaho, the Tetons and the Big Horns of Wyoming, and the Cypress Hills of Alberta. They are further extended to include the Black Hills and smaller chains in their neighborhood. Over this area RYDBERG says the flora is practically homogeneous, and includes among other trees not found in the southern part *Larix occidentalis, Abies grandis, Tsuga heterophylla, T. mertensiana, Thuja plicata, Taxus brevifolia,* and several species of *Betula, Salix,* and *Populus.* In a further analysis of the flora, species exclusively southern and those common throughout the range are noted. Notes are also made of habits of growth and peculiarities of distribution of the more important trees and of the variation of altitudinal range of the zones.

[22] BOT. GAZ. **50**:233–234. 1910.

[23] BOT. GAZ. **59**:64–65. 1915.

[24] RYDBERG, P. A., Phytogeographical notes on the Rocky Mountain region. IV. Forests of the subalpine and montane zones; V. Grasslands of the subalpine and montane zones. Bull. Torr. Bot. Club **42**:11–25, 629–642. 1915.

The second of these papers contains an analysis of the flora of the various mountain grasslands, those of the montane zone receiving most attention. Many species are common to the montane and subalpine zones, rather more to the montane and plains, while a smaller number are limited to either the northern or the southern montane zones only. Little attempt is made to analyze the composition and dynamics of the various grassland associations.—GEO. D. FULLER.

Fungus lore.—In his presidential address before the British Mycological Society in 1914, BULLER[25] has given a very interesting account of what he calls the fungus lore of the Greeks and Romans. It is an admirable résumé of the ancient literature of fungi, and gives to the general botanist much information which he will prize. Such topics as the following suggest the kind of information presented: edible and poisonous fungi, the dawn of mycology, the first known illustration of a fungus, the rust disease, the origin of fungi, the medicinal properties of fungi, the origin of poisons in fungi, the cultivation of fungi, the misuse of classical names by LINNAEUS, etc. It is shown that the Greeks and Romans were familiar with many kinds of edible and poisonous fungi. As to the origin and reproduction of fungi, they were in complete ignorance, in general being contented to accept a theory of spontaneous generation.

In a presidential address before the Royal Society of Canada in 1915, BULLER[26] continues the publication of his historical researches by presenting an account of "MICHELI and the discovery of reproduction of fungi."—J. M. C.

Blooming period of Dendrobium.—RUTGERS and WENT[27] have investigated the factors concerned in the blooming of *Dendrobium crumenatum*, whose flowers open simultaneously on different individuals. They find that this coincident blooming of different plants depends upon the prevailing external conditions; and since these may vary in different places, the blooming period shows local variations. They conclude that light cannot exert any definite influence on the time of blooming, although it influences the number of flowers; and therefore they consider temperature or atmospheric moisture, or both factors together, to be responsible. The development of the flowers proceeds slowly up to a definite stage, at which they remain until some inhibitory influence is resolved by external factors. When this has occurred, the last stage in the opening of the flowers is accomplished in a few days. The external

[25] BULLER, A. H. R., The fungus lore of the Greeks and Romans. Trans. British Mycol. Soc. pp. 66. 1914.

[26] BULLER, A. H. R., MICHELI and the discovery of reproduction in fungi. Trans. Roy. Soc. Canada **9**:1–25. *pl. 4.* 1915.

[27] RUTGERS, A. A. L., and WENT, F. A. F. C., Periodische Erscheinungen bei den Blüten des *Dendrobium crumenatum* Lindl. Ann. Jard. Bot. Buitenzorg **14**:129–160. *pl. 22. figs. 5.* 1915.